The family of devices proposed here can be integrated with electronics, thus making part of the electronic circuit. In short, the family of devices proposed increase the family of electronic devices available to circuit designers of RF circuits and RF electronics. Not to forget is that the character of these devices can be changed by the application of DC bias. Thus, the transformer ratio or the filter response can be altered to fit variation in a circuit, such as due to aging, and force the response of the circuit to be stable and the same over long periods of time.

The present invention has now been described in accordance with several exemplary embodiments, which are intended to be illustrative in all aspects, rather than restrictive. Thus, the present invention is capable of many variations in detailed implementation, which may be derived from the description contained herein by a person of ordinary skill in the art. All such variations are considered to be within the scope and spirit of the present invention as defined by the following claims and their legal equivalents.

CLAIMS

1. An electromechanical device, comprising:
   (a) two or more electrodes;
   (b) a membrane positioned with said two or more electrodes, wherein one of said two or more electrodes is an input electrode and receives an electrical signal that causes vibration of said membrane and said vibration is coupled to at least one of said two or more electrodes that is an output electrode; and
   (c) a ground referenced to said input electrode and said output electrode.

2. The electromechanical device as set forth in claim 1, wherein said membrane is positioned at a distance from said two or more electrodes.

3. The electromechanical device as set forth in claim 1, wherein said two or more electrodes are positioned at various distances from said membrane.

4. The electromechanical device as set forth in claim 1, wherein said membrane is a vibrating coupling membrane.

5. The electromechanical device as set forth in claim 1, wherein a DC bias voltage is applied to said two or more electrodes to set or modify a width of a gap in said electromechanical device.

6. The electromechanical device as set forth in claim 1, wherein said electromechanical device is a transformer.

7. The electromechanical device as set forth in claim 1, wherein said electromechanical device is a capacitor.

8. The electromechanical device as set forth in claim 1, wherein said electromechanical device is a resonator.

9. The electromechanical device as set forth in claim 1, wherein said electromechanical is a filter.

10. The electromechanical device as set forth in claim 9, wherein said filter operates around a resonant frequency.

11. The electromechanical device as set forth in claim 1, further comprising a control voltage to dynamically change said coupling between said input electrode and said output electrodes.

12. The electromechanical device as set forth in claim 1, wherein said two or more electrodes are positioned side by side on said membrane.

13. The electromechanical device as set forth in claim 1, wherein membrane is selected from the group consisting of silicon nitride, silicon carbide, diamond, silicon and glass.

14. The electromechanical device as set forth in claim 1, wherein said membrane has varying shapes

15. The electromechanical device as set forth in claim 1, wherein said two or more electrodes have varying shapes.

16. A method of making an electromechanical device, comprising the steps of:

(a) providing two or more electrodes;

(b) providing a membrane positioned with said two or more electrodes, wherein one of said two or more electrodes is an input electrode receiving an electrical signal that causes vibration of said membrane and said vibration is coupled to at least one of said two or more electrodes that is an output electrode; and

(c) providing a ground reference to said input electrode and said output electrode.

17. The method as set forth in claim 16, wherein said membrane is positioned at a distance from said two or more electrodes.

18. The method as set forth in claim 16, wherein said two or more electrodes are positioned at various distances from said membrane.

19. The method as set forth in claim 16, wherein said membrane is a vibrating coupling membrane.

20. The method as set forth in claim 16, wherein a DC bias voltage is applied to said two or more electrodes to set or modify a width of a gap in said electromechanical device.

21. The method as set forth in claim 16, wherein said electromechanical device is a transformer.

22. The method as set forth in claim 16, wherein said electromechanical device is a capacitor.

23. The method as set forth in claim 16, wherein said electromechanical device is a resonator.

24. The method as set forth in claim 16, wherein said electromechanical is a filter.

25. The method as set forth in claim 24, wherein said filter operates around a resonant frequency.

26. The method as set forth in claim 16, further comprising the step of providing a control voltage to dynamically change said coupling between said input electrode and said output electrodes.

27. The method as set forth in claim 16, wherein said two or more electrodes are positioned side by side on said membrane.

28. The method as set forth in claim 16, wherein membrane is selected from the group consisting of silicon nitride, silicon carbide, diamond, silicon and glass.

29. The method as set forth in claim 16, wherein said membrane has varying shapes.

30. The method as set forth in claim 16, wherein said two or more electrodes have varying shapes.

31. An electronic system, comprising:

(a) an electronic circuit; and

(b) one or more membrane devices integrated with said electronic circuit.

32. The electronic system as set forth in claim 31, wherein a DC bias voltage is applied to said one or more membrane devices to set a width of a gap.

33. The electronic system as set forth in claim 31, wherein said one or more membrane devices is a transformer.

34. The electronic system as set forth in claim 31, wherein said one or more membrane devices is a capacitor.

35. The electronic system as set forth in claim 31, wherein said one or more membrane devices is a resonator.

36. The electronic system as set forth in claim 31, wherein said one or more membrane devices is a filter.

37. The electronic system as set forth in claim 36, wherein said filter operates around a resonant frequency.

38. The electronic system as set forth in claim 31, wherein said one or more membrane devices comprises a control voltage to dynamically change said coupling between an input electrode and at least one output electrode of said device.

39. A method of making an electronic system, comprising the steps of:

(a) providing an electronic circuit; and

(b) providing one or more membrane devices integrated with said electronic circuit.

40. The method as set forth in claim 39, wherein a DC bias voltage is applied to said one or more membrane devices to set a width of a gap.

41. The method as set forth in claim 39, wherein said one or more membrane devices is a transformer.

42. The method as set forth in claim 39, wherein said one or more membrane devices is a capacitor.

43. The method as set forth in claim 39, wherein said one or more membrane devices is a resonator.

44. The method as set forth in claim 39, wherein said one or more membrane devices is a filter.

45. The method as set forth in claim 44, wherein said filter operates around a resonant frequency.

46. The method as set forth in claim 39, wherein said one or more membrane devices comprises a control voltage to dynamically change said coupling between an input electrode and at least one output electrode of said device.